Teaching Statement

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My teaching philosophy is influenced by my experiences homeschooling as a child. From the ages of 7 to 11, much of my time was spent walking alone in the woods, browsing through nature with an open sky, trees, bugs, and lizards. I built ill-conceived structures with sticks and branches. I smashed river rocks and watched them sparkle. To the horror of my parents, I filled jars with spiders and categorized them in a "zoo". My mother would say that "*tranquility promotes creativity*". This formative focus on open spaces and play in my education continues to influence my teaching perspective.

Teaching Perspective

In addition to my personal experiences, my teaching perspective is shaped by educators such as Illich [1], Montessori [2], Amabile [3], and Carlin[1]. My position is that learning is a process best encouraged by inspiring intrinsic motivation and promoting a playful outlook that emphasizes constant learning. This perspective contributes to the following emphases in my teaching:

Courses Begin the Process

I frame course content as an appetizer rather than a certification of mastery. In my graduate education and professional career, I am less concerned with total mastery as I gain more experience. There is no end to edge cases and required skills that will be required after sudden necessity rather than predictable with careful planning. "Education" as such never ends. The world changes and the skills that students will need to know in concrete form are impossible to predict. Because of this, it is important to explain how inevitably one must accept that the ability to adapt principles is more important than particular answers. This process of navigating new ideas is creative [2] (see Figure 1). To have a full understanding of subjects is to understand how incomplete the body of knowledge is, both in the

[1] George Carlin famously said, *"They don't want well-educated people capable of critical thinking . . . They want obedient workers . . . who are just smart enough to run the machines and do the paperwork.*

Bruce E Levine. *Resisting Illegitimate Authority: A Thinking Person's Guide to Being an Anti-Authoritarian—Strategies, Tools, and Models*. AK Press, 2018

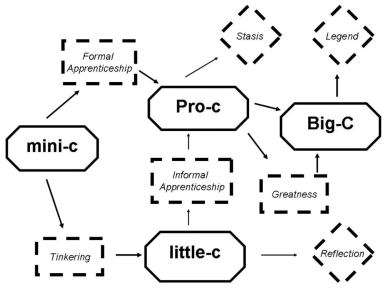

Figure 1: Kaufman et al. model "mini-c" creativity as the small insights that build into more novel and impactful Big-C creativity.

[2] James C Kaufman and Ronald A Beghetto. Beyond big and little: The four c model of creativity. *Review of general psychology*, 13(1):1–12, 2009

particular contours of one's own personal grasp of it and the general state-of-the-art. Understanding how to ask the right questions in unfamiliar territory and to and vet approaches is crucial.

Primary Sources Establish Credibility

It is important to expose students to primary sources as soon as possible. Classic papers such as Google's Page Rank, Vannevar Bush's *As We May Think*, and other primary sources of knowledge carry an ethos that helps build a personal appreciation and satisfaction. First principles thinking is a powerful tool for educators and students. As students collect skills and information, they reflect on them and internalize their contents to their own purposes [3] (Figure 2). In Math courses, teachers walk through proofs to help students believe, understand, and later derive their own answers and abstractions. In HCI, learning by example often involves retracing the steps and historical thought processes that contributed to modern ways of working on software, interfaces, and research design. Learning by example through primary sources gives students the ability to believe, understand, and create their own solutions to problems.

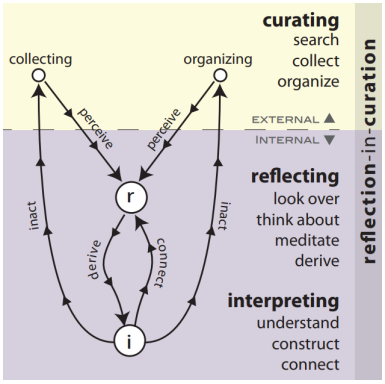

Figure 2: The collecting and organizing processes students use involves iterative cycles of reflection and interpretation. They relate collected ideas to each other apply it to their own projects.

[3] Andrew M. Webb, Rhema Linder, Andruid Kerne, Nic Lupfer, Yin Qu, Bryant Poffenberger, and Colton Revia. Promoting reflection and interpretation in education: Curating rich bookmarks as information composition. In *Proceedings of the 9th ACM Conference on Creativity&Cognition*, C&C '13, pages 53–62, New York, NY, USA, 2013. ACM

Projects Create Practical Experience

Project-based homework provides the experience necessary for personal and professional maturity. Montessori claims , "Only practical work and experience lead the young to maturity. . . before they can practice on their own [4]." Projects in Computer Science courses are not rare because they are necessary and useful. As a student, I preferred projects over tests and problems sets of homework. While all of these educational instruments are valuable and have a purpose, none provide as much satisfaction and flexibility in learning. Crucially, projects with a moderate amount of freedom can lead to situations where students have to find their own resources and build relate the software and ideas into useful knowledge. Amabile's research [5] has found that intrinsic motivation, originating from an individual's drive [6] rather than extrinsic motivation such as a bad grade produces less stress and better creative outcomes. I prefer to teach with projects that require coding and design homework. More open and less rigid than input-to-output projects, such as making games or mobile applications, provides new opportunities for self-driven learning. They also surface common obstacles to development, including technological incompatibility, deployment and tooling work, and team collaboration.

[4] Maria Montessori. *The absorbent mind*. Lulu. com, 1959

[5] Teresa M Amabile. *Growing up creative: Nurturing a lifetime of creativity.* Crown House Publishing Limited, 1989

[6] In one lab session I taught, a student said"It feels like Christmas morning!" She said this after working through a difficult coding challenge. This is an example the payoff of work in the context of a project.

Advising and Teaching Assistance

As a PhD student, I worked in collaboration with a number of undergraduates that became co-authors on papers. This required working in an mentorship role, teaching software development, interview skills, qualitative analysis, quantitative analysis, scientific writing, and visualization tools such as R and ggplot2.

I have been a Teaching Assistant for several courses where I was responsible for leading lab exercises, holding office hours, grading homework and tests, and occasionally lecturing. I also worked with professors to develop homework exercises, grading rubrics, and generally aid in the development of courses. These courses have included introductory programming courses (C++ and Java), Discrete Mathematics, and advanced courses in my research area of Human-computer Interaction courses.

Service

While I was in graduate school, I taught middle school and high school students computer related courses to the Homeschooling community in College Station. I developed a general computing skills course on spreadsheet and web search, a course on MIT's Scratch for visual programming, a Python that for creating games, and a course using Processing (a Java-like software sketchbook).

Teaching Interest

At the graduate level, I would also be interested in teaching and developing advanced courses that focus on HCI, research design, visualization, applied machine learning, and software development.

- Mixed Methods Research and Requirements Gathering - This course would teach engineers and CS majors qualitative methods that are useful that apply to requirements gathering, but are also relevant for research.
- Human-Computer Interaction - This course would teach students about interaction design, usability and accessibility issues, and a include a primer on research methods.
- Visualization for Research and Dashboards - This course would review research on visualization and include course projects that involve interactive web tools (e.g. d3.js, works by Edward Tufte and Ben Shneiderman).

- Algorithms and Machine Learning for Generative Art - This course would demonstrate practical applications of ML focused on visual and textual art, focusing on technologies related to GPT and GANs.

At the undergraduate level, I am comfortable teaching various courses not strongly related to my specific research that are under the umbrella of Computer Science. For example, courses at this level include Software Engineering, "Capstone" or senior thesis projects, introductory programming courses, and Data Structures.

References

[1] Ivan Illich and Anne Lang. Tools for conviviality. 1973.

[2] Maria Montessori. *The absorbent mind*. Lulu. com, 1959.

[3] Teresa M Amabile. *Growing up creative: Nurturing a lifetime of creativity.* Crown House Publishing Limited, 1989.

[4] Bruce E Levine. *Resisting Illegitimate Authority: A Thinking Person's Guide to Being an Anti-Authoritarian—Strategies, Tools, and Models*. AK Press, 2018.

[5] James C Kaufman and Ronald A Beghetto. Beyond big and little: The four c model of creativity. *Review of general psychology*, 13(1):1–12, 2009.

[6] Andrew M. Webb, Rhema Linder, Andruid Kerne, Nic Lupfer, Yin Qu, Bryant Poffenberger, and Colton Revia. Promoting reflection and interpretation in education: Curating rich bookmarks as information composition. In *Proceedings of the 9th ACM Conference on Creativity&Cognition*, C&C '13, pages 53–62, New York, NY, USA, 2013. ACM.